# SECTION 15

# Wheels and Tires

# WHEELS AND TIRES

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# 15.A.1 SPECIFICATION FOR 2605 (2WD):

| | | |
|---|---|---|
| Front Tires | : | 6.00 × 16 - 6 PR |
| Rear Tires | : | 13.6 x 28 - 8 PR |

## SPECIFICATION FOR 2605 (4WD):

| | | |
|---|---|---|
| Front Tires | : | 10.5/80 x 18 |
| Rear Tires | : | 13.6 x 28 - 8 PR |

## Recommended tires pressures

Front Tires: 29 psi/200 Kpa/2.0 Kgf/$cm^2$ -for field work (For 2WD/4WD)

34psi/230 Kpa/2.3 Kgf/$cm^2$ -for haulage (For 2WD/4WD)

Rear Tires: 12psi/80 Kpa/0.8 Kgf/$cm^2$ -for field work

18psi/120 Kpa/1.2 Kgf/$cm^2$ -for haulage

10psi/70 Kpa/0.7 Kgf/$cm^2$ -for paddy work

**CAUTION : Do not run the tractor with low tire pressure.**

Check the tightness of front wheel bolt and rear wheel nuts frequently

Front Wheel bolt - 60 lbf.ft. (81 Nm)

Rear Wheel Nut - 190 - 200 lbf.ft. (258 - 271 Nm)

## Torque Values

| | | |
|---|---|---|
| Disc to rim | : | 90 – 110 lbf. ft.(122 - 149 Nm) |
| Rear wheel nuts | : | 190 – 200 lbf. ft.(258 - 271 Nm) |
| Front wheel bolts | : | 60 lbf. ft. (81 Nm). |

## Special Tool

"Bead-breaking" tool

3 lb Hammer

Tire Levers

## 15.A.2 SPECIFICATION FOR 2615 (2WD):

| | | |
|---|---|---|
| Front Tires | : | 7.50 X 16 - 6 PR |
| Rear Tires | : | 13.6 x 28 - 8 PR |

**SPECIFICATION FOR 2615 (4WD):**

| | | |
|---|---|---|
| Front Tires | : | 10.5 / 80 x 18 |
| Rear Tires | : | 13.6 x 28 - 8 PR |

### Recommended tires pressures

Front Tires: 29 psi/200 Kpa/2.0 Kgf/$cm^2$ -for field work (For 2WD/4WD)

34psi/230 Kpa/2.3 Kgf/$cm^2$ -for haulage (For 2WD/4WD)

Rear Tires: 12psi/80 Kpa/0.8 Kgf/$cm^2$ -for field work

18psi/120 Kpa/1.2 Kgf/$cm^2$ -for haulage

10psi/70 Kpa/0.7 Kgf/$cm^2$ -for paddy work

**CAUTION : Do not run the tractor with low tire pressure**

Check the tightness of front wheel bolt and rear wheel nuts frequently

Front Wheel bolt - 60 lbf.ft. (81 Nm)

Rear Wheel Nut - 190 - 200 lbf.ft. (258 - 271 Nm)

### Torque Values

| | | |
|---|---|---|
| Disc to rim | : | 90 – 110 lbf. ft.(122 - 149 Nm) |
| Rear wheel nuts | : | 190 – 200 lbf. ft.(258 - 271 Nm) |
| Front wheel bolts | : | 60 lbf. ft. (81 Nm). |

### Special Tool

"Bead-breaking" tool

3 lb Hammer

Tire Levers

# 15.A.3 REAR WHEELS AND TIRES

## Rear Tires

## General

The tires fitted to the tractors can be divided fairly easily into three separate categories :

1. Field.
2. Universal Field and Road.
3. Grassland, Sand or Hard Surface.

Each of the above types of tire has been designed especially to give the best grip and wear characteristics obtainable in the specified conditions. On grassland, such as parks and golf courses, worn field or universal type tires can also be used successfully.

***Traction***

Very few tractors are used to their fullest capacity, mainly due to inability of the driver to control excessive wheelspin.

If a tractor is being driven along a smooth, flat surface, the tire tread will grip the road provided that the torque applied to the wheel is not in excess of the coefficient of friction between the tire and the road. When the tire grips the road without slipping, the condition is one of 100% traction.

Unfortunately, due to tread design and other factors, the maximum rate of traction normally obtainable in the most favourable conditions (i.e. smooth concrete) is approximately 90%, i.e. the tractor will pull a load of 90% of the weight acting on its rear wheels, e.g. a tractor is working on smooth dry concrete, with a weight of 5000 lb. acting on its rear wheels. Allowing for a coefficient of traction of 90%, the tractor will be capable of pulling a load of approximately.

When ploughing, or performing smiler operations in the field, the coefficient of traction is reduced to around 45 to 50%. This is the reason for ballasting the rear end of the tractor, thereby increasing the weight acting on the rear axle and thus increasing the tractive effort of the tractor.

$$\frac{5000}{1} \times \frac{90}{100} = 4500 \text{ lb}$$

The coefficients of traction mentioned above can only be achieved by ensuring that all of the factors which affect tractor performance are adjusted to suit the ground conditions.

Some of the factors are :

1. Tire Pressures – must be set at the lowest pressure permissible for the load being carried and the size and ply-rating of tire being used.
2. Tire Tread – the tire tread should not be more than 1/3 to 1/2 worn for efficient ploughing. The lug-bars must face in the correct direction (most tires have arrows on the sidewalls to indicate the correct direction of rotation).
3. The correct section and size of tire should be used for certain ground conditions. Some examples are:
   (a) Clay – Large diameter, narrow section tires. These tires have a small contact area and will concentrate a larger amount of weight on the contact area than would a wide section tire, thus helping the lug-bars to 'bite' into the soil and give traction.
   (b) Very light sandy soil – or peat. Any wide section tire will allow the weight acting on the rear end of the tractor to be spread over a larger area than with a narrow tire, thus preventing sinkage and crushing of the furrow.
   (c) Stony Ground – Large diameter, wide section tires will spread the wear out over a large area of tread and give good flotation.
   (d) Sand – Sand requires an entirely different type of tire, for if ordinary lug-bar type tires are used they will greatly disturb the surface of the sand and rapidly dig themselves into an every increasing depth. In these conditions, a smooth tread pattern, on as wide a tire as possible is required, to disturb the surface as little as possible and give good flotation.

### *Pressures*

Tire pressure must be maintained at the manufacturer's recommended minimum to give the best possible performance.

Incorrect inflation of tires has the following effects:

### *Over-inflation*

Excessive tire pressure deprives the tire of its self-cleaning properties. This causes wheelspin, which in turn causes sinkage, thus increasing the rolling resistance of the tire and lowering the power available for traction.

Frequent and prolonged bouts of wheelspin cause rapid tire wear. Another effect of over-inflation is that the tread and sidewalls of the tire are very susceptible to damage from sharp rocks or similar objects due to the inability of the casing to 'give' on contact.

### *Under-inflation*

If a tire has insufficient pressure to support the casing, this may be deflected to such an extent that the plies may become separated. Such damage is irrepairable and the tire must be replaced. Excessive deflection allied to a high drawbar pull can cause wrinkling of the tire sidewalls which, if allowed to occur continually can cause the tire to 'creep' on the rim and tear out the valve.

A visible warning of under-inflation is uneven wear of the lug-bars, indicated by 'gouging' of the centre of the bars.

### *Cleanliness*

Certain liquids can cause considerable harm to tires, if they are not quickly removed. Some of the worst offenders are oil, grease and some crop sprays, which can contain considerable quantities of acid or alkali. If any of the above penetrate into the plies through small holes or splits, rapid deterioration will result.

### *Effective Tires Pressures*

Under normal conditions the following pressures can be used, but must be increased if extra loading is involved.

Ploughing : 12 psi (0.844 kg. / cm.$^2$)

If bolt-on ballast weights are used, the pressure must be raised accordingly. When working on a hillside pressure should be raised by 2 psi (0,14 kg / cm.$^2$) in both tires, because as each tire alternately takes most of the load when it is on the side of the tractor nearest the bottom of the slope, the pressure must be raised accordingly to slope.

When using a non-reversible plough the pressure of the land side tire may be reduced by 2 psi (0,14 kg. / cm.$^2$), although the differential lock if fitted should be used to compensate for wheelspin by one wheel only.

### *Road Work*

When driving a tractor on the road, higher speeds can be used then in the field. In such conditions the pressure can be raised by 4 psi (0,28 kg./ cm.$^2$) to prevent squirming and gouging of the lug-bars.

If a two-wheel trailer, or manure spreader is used, the weight exerted on the tractor drawbar should be determined and, the pressure adjusted to suit.

### *Using a Front End Loader*

If a loader is fitted to the tractor, a counter-weight is frequently fitted to the tractor rear linkage as a safety precaution. If a counter-weight is to be fitted, the tire pressure should be raised to compensate.

# 15.A.4 TRACK SETTINGS FOR MF 2605

Front Wheel Track settings can be varied from 52.8 to 72.8 inch (1320 to 1830 mm) in 4 inch (102 mm) increments. Track

Rear Wheel Track settings can be varied from 52.8 to 72.8 inch (1341 to 1849 mm) in 4 inch (102 mm) increments. Track

***FRONT TRACK FOR 2WD***

The front wheel track is adjustable in steps of 4 inch (102 mm approx.) from 52.8 to 72.8 inch (1320–1830 mm). The settings are obtained as follows: (Refer Fig. 1a).

Jack up the tractor and remove three bolts securing each front axle to centre axle and spread axle arms to obtain desired track width. No change in steering connections is necessary. Replace bolts, leaving at least one bolt hole between the two bolts to give additional support.

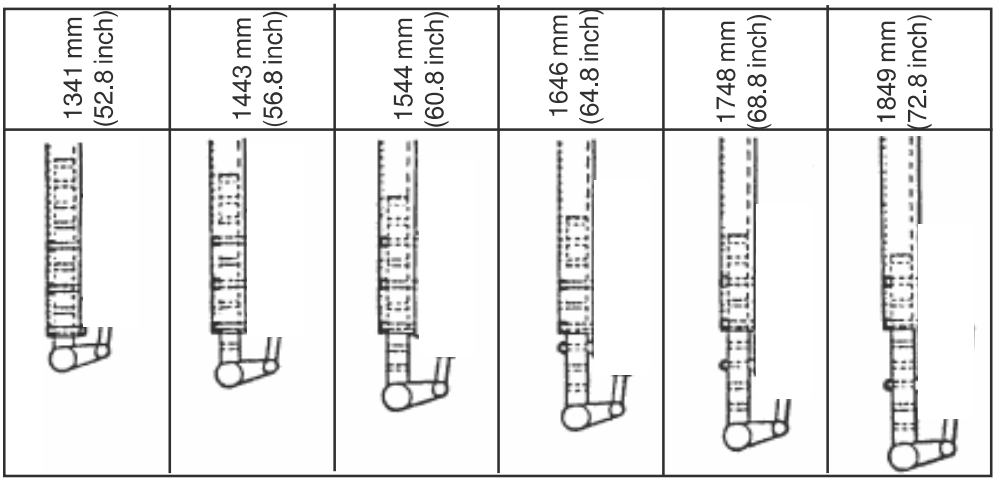


Fig. 1a

***REAR TRACK***

The rear wheel track is adjustable in 4 inch (102 mm, approx.) steps from 52 to 72 inch (1320 mm to 1828 mm) The settings are obtained as follows: (Refer Fig. 1b).

The rear wheel track is adjustable by assembling the disc and rim in different positions. At the same time, interchanging of the wheels may be necessary in order to maintain maximum traction.

Ensure that the rear tires are on their correct side by checking that the arrow on the side of the tire points in the direction of forward rotation.

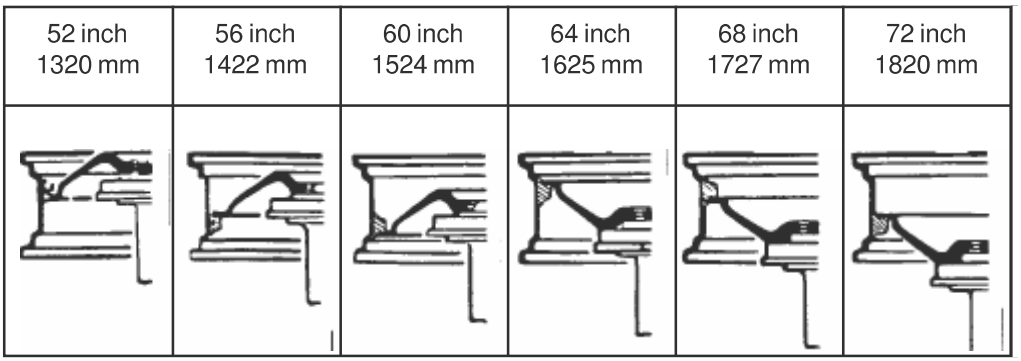


Fig.1b

# 15.A.4 TRACK SETTINGS FOR MF 2615

Front Wheel Track settings can be varied from 53.6 to 73.6 inch (1320 to 1830 mm) in 4 inch (102 mm) increments. Track

Rear Wheel Track settings can be varied from 52 to 72 inch (1445 to 1897 mm) in 4 inch (102 mm) increments. Track

***FRONT TRACK FOR 2WD***

The front wheel track is adjustable in steps of 4 inch (102 mm approx.) from 52.8 to 72.8 inch (1361 - 1870 mm). The settings are obtained as follows: (Refer Fig. 1a.1).

Jack up the tractor and remove three bolts securing each front axle to centre axle and spread axle arms to obtain desired track width. No change in steering connections is necessary. Replace bolts, leaving at least one bolt hole between the two bolts to give additional support.

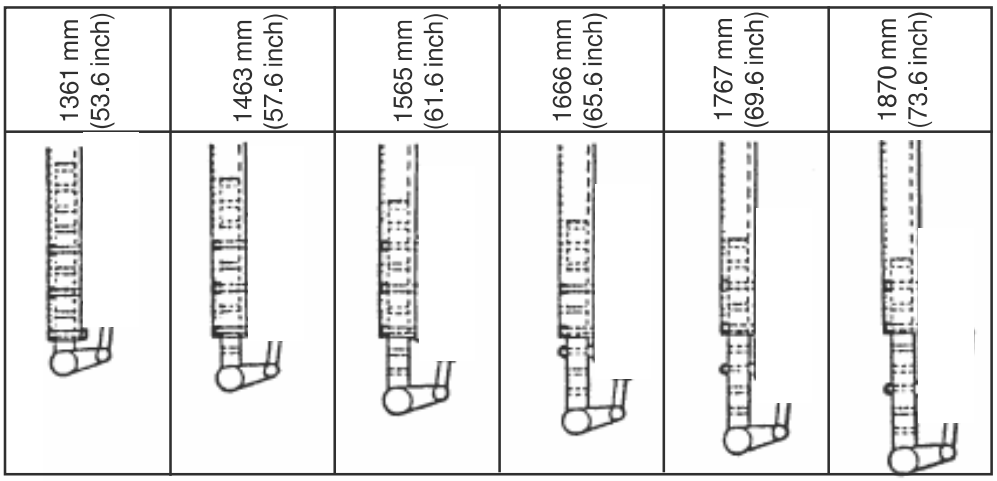


Fig.1a.1

***REAR TRACK***

The rear wheel track is adjustable in 4 inch (102 mm, approx.) steps from 52 to 72 inch (1320 mm to 1828 mm) The settings are obtained as follows: (Refer Fig. 1b.1).

The rear wheel track is adjustable by assembling the disc and rim in different positions. At the same time, interchanging of the wheels may be necessary in order to maintain maximum traction.

Ensure that the rear tires are on their correct side by checking that the arrow on the side of the tire points in the direction of forward rotation.

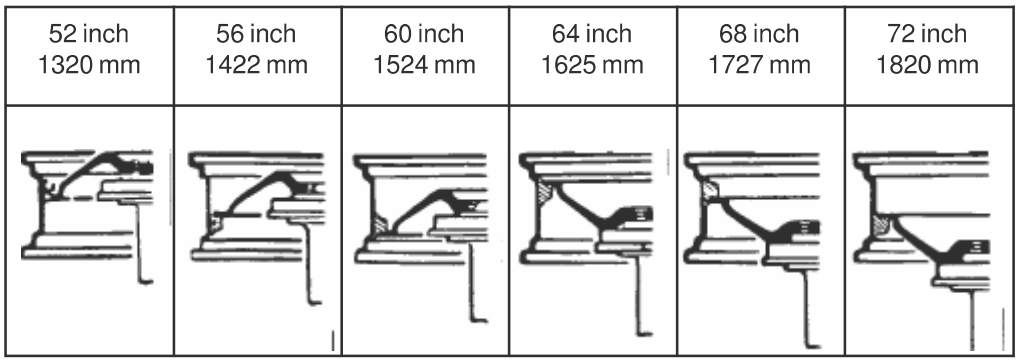


Fig.1b.1

## 15.A.5 FRONT WHEELS AND TIRES

The Tractor fitted with pressed steel rims and discs.

***Tire Pressures***

Front tire pressures are very critical, as they can affect the steering characteristics of the tractor considerably.

Refer specifications section for recommended tire pressure.

***Front Wheels and Tires***

For removal and refitment of front tube and tire, follow the procedure given for rear tire and ensure the front wheel pressure is maintained as per recommendation.

***Note :*** *Always use a safety cage (Fig. 2.)*

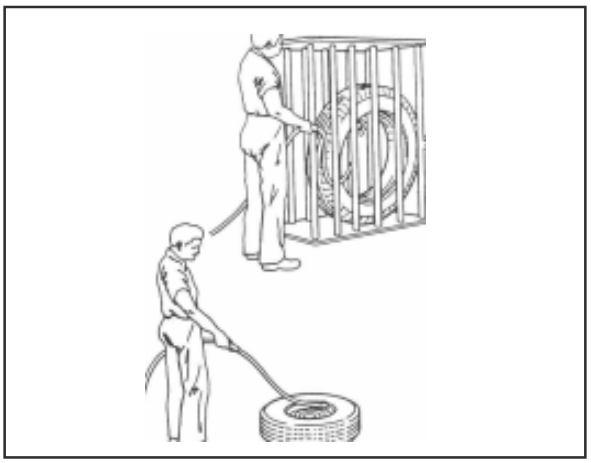

Fig. 2

## 15.A.6 REAR INNER TUBE

### Removal and Refitment

### Special Tools

"Bead-breaking" tool

3 lb Hammer

Tire Levers

**Removal**

1. Lay the wheel on the ground with the valve stem up.
2. Deflate the tire by removing the valve core and the valve retaining nut.
3. Drive the "Bead-breaking" tool between the tire and rim, taking care not to damage the rim or the tire. (Fig. 3).
4. After the bead has been released from the rim, invert the wheel and repeat above procedure 3.
5. Lubricate the rim, tire and base of the tube with a solution of soap and water or similar rubber lubricant. (Fig. 4).

***Note :*** *Never use petroleum or silicone base greases.*

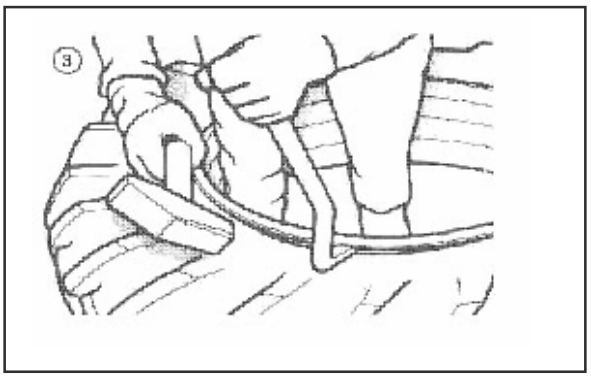


Fig. 3

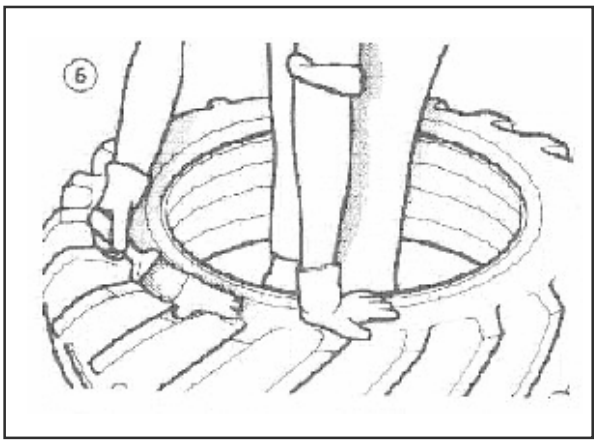


Fig .4

6. Starting at the valve location, pry the tire off the rim, taking small bites with tire levers, and ensuring that the bead on the opposite side is fully located in the mounting well. (Fig. 5).

7. With the wheel in a vertical position, pull the tire forwards and remove the tube. (Fig. 6).

## Examinations

**Examine the bead seating area of the rim. Remove any build-up of rust, corrosion or old rubber. Inspect inside the tire casing for foreign matter or damage.**

### Refitment

1. Inflate the tube until "rounded out". Place the tube in the tire with the valve located in the valve hole of the rim. Refit the valve retaining nut to finger tight. (Fig. 7).

2. Refit the tire, starting opposite the valve location taking small bites with long tire levers and keeping the fixed part of the bead fully located in the well. (Fig. 8).

   A solution of soap and water, or similar rubber lubricant, brushed onto the rim and bead will help fitment.

   ***Note :*** *Care must be taken not to pinch the tube when fitting.*

3. Centre the tire on the rim and inflate to approx. 2.5 kg/cm$^2$ (35 psi).

   **WARNING : Never stand over the assembly when inflating, remote control inflation equipment should be used.**

4. Remove the valve core and completely deflate the tire.

5. Refit the valve core and inflate to recommended pressure.

   ***Note :*** *If beads fail to seat at 2.5 kg/cm$^2$ (35 psi) the tube may be pinched, do not increased the pressure but remove the valve core and release tire from rim. Lubricate tire, bead and rim and re-inflate to 2.5 kg/cm$^2$ (35 psi) repeat process unit both beads are properly seated.*

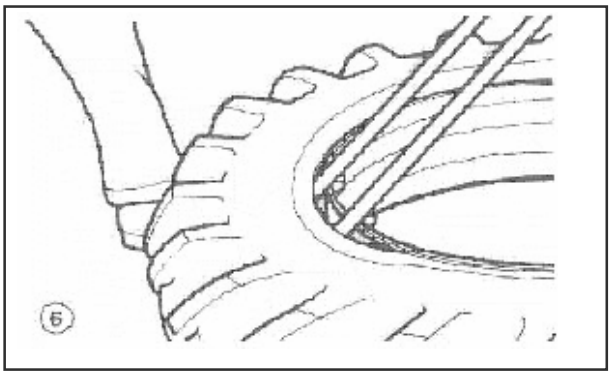


Fig. 5

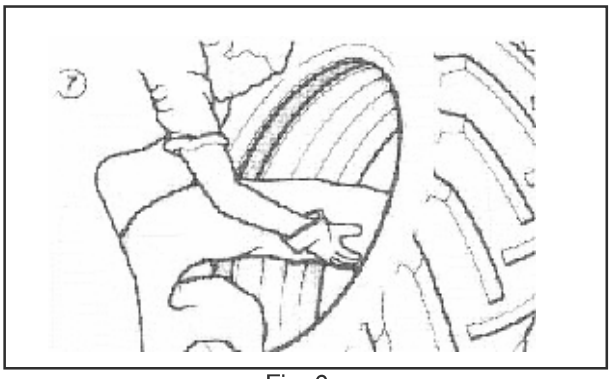


Fig. 6

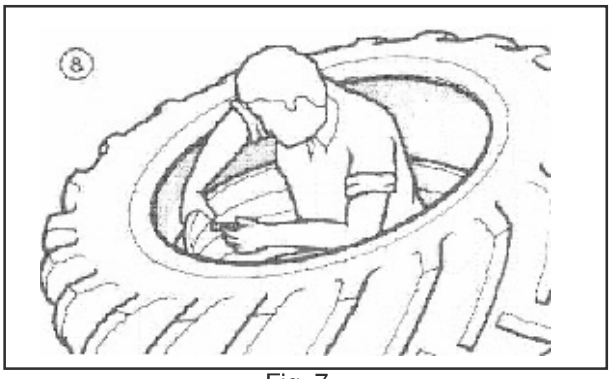


Fig. 7

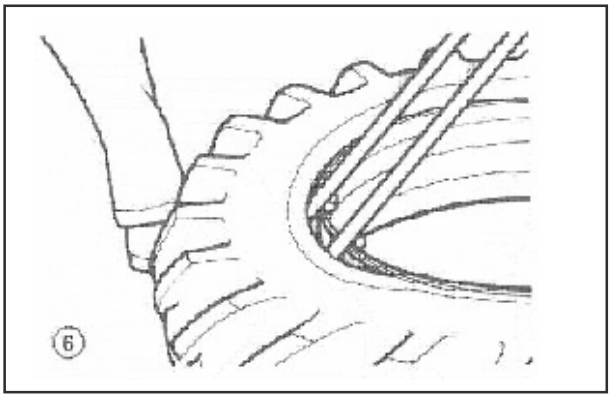


Fig. 8

# 15.A.7 REAR TIRE

## Removal and Refitment

### Special Tools

"Bead-breaking" tool

3 lb Hammer

Tire Levers

### Removal

1. Remove the inner tube. See operation 15.A.6.
2. With the wheel in a vertical position pry off the tire taking small bites with the tire levers. The use of rubber lubricant will help removal. (Fig. 9).

### Refitment

1. Place the rim on the ground, lubricate the bead and rim and place the tire on rim. (Fig. 10).
2. Refit the tire to rim, using long tire levers. (Fig. 11).
3. Refit the inner tube.

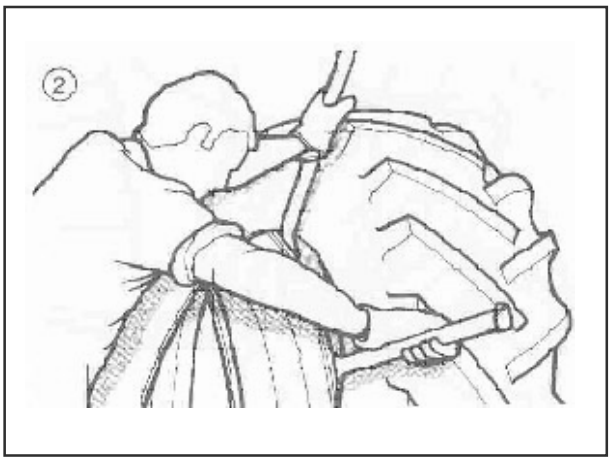


Fig.9

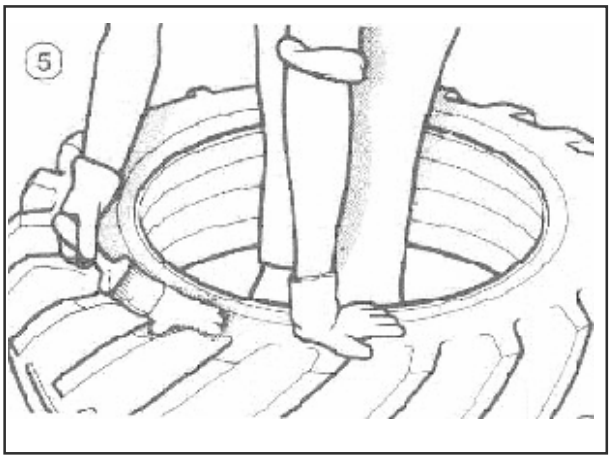


Fig.10

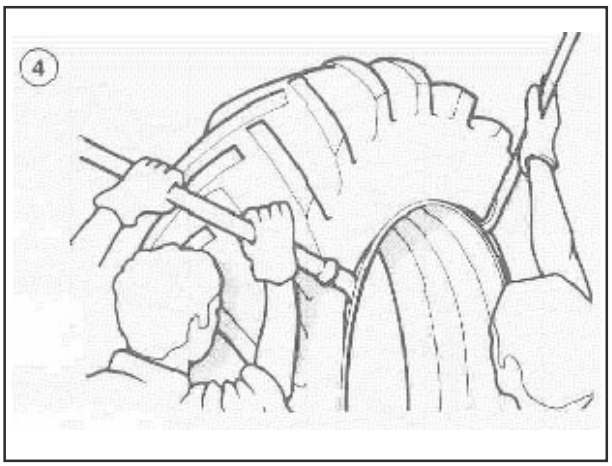


Fig.11

# 15.A.8 BALLASTING

## Liquid Ballast

Liquid filling of tires is a well known and widely used method of weighting the rear of a tractor. To prevent tire damage by frost, calcium chloride should be dissolved in the water used to fill the tires, thus forming an anti-freeze solution. The calcium chloride used should be "Commercial Grade 70 to 72% $Ca.Cl_2$.".

## Ballasting Procedure

**WARNING : Never pour water on to calcium chloride, always add calcium chloride to water.**

Never attempt to add pure calcium chloride to a tire filled with water, as the resultant heat and expansion can cause tire damage.

There are two separate methods of liquid ballasting tractor tires :

1. 75% filling.
2. 100% filling.

The 75% filling method is the most common, being somewhat easier to achieve than 100% filling and not requiring a motorised pump.

***75% Ballasting***

1. Using the tractor jack, raise the rear wheels just clear of the ground.
2. Ensure that the tire valve is secured to the rim, either by a mounting cone or valve nut. If so, deflate the tire.
3. Check that an air-water type valve core is fitted to the valve.
4. Position the valve by turning the wheel until the valve is at "12 O'clock". (i.e. vertical and at the top).
5. Connect the water adapter to the valve and place the solution suction tube in the tank of solution.
6. Pump the solution into the tire until a steady stream of solution pours from the breather hole. This indicates that the tire has been filled up to the level of the valve, which is approximately 75% of the tire's capacity.
7. Disconnect the water adapter.
8. Using a special air-water gauge, adjust the air pressure in the tire to that recommended for the load being carried by the rear of the tractor.

***100% Ballasting***

***Note :*** *A motorised pump is essential for 100% ballasting. Operating procedure is usually provided with such pumps.*

1. Using a floor jack capable of proper lifting capacity, raise the rear wheels clear of the ground.
2. Ensure that the tire valve is secured to the rim, either by a mounting cone or valve nut. If so, deflate the tire.
3. Ensure that an air-water type valve is fitted to the valve body.
4. Position the valve, by turning the wheel, until the valve is in the "6 O'clock" position. (i.e. vertical and at the bottom). This is most important.
5. Fit an adapter extension tube to the special type water adapter (Fig. 12). The length of the extension tube depends on the size of tire being filled :

   6 inch (152. 4 mm) tube for 7 to 10 inch (177.8 to 254 mm) tires.

   8 inch (203. 2 mm) tube for 10 to 13 inch (254 to 330.2 mm) tires.

   12 inch (304. 8 mm) tube for 13 to 15 inch (330.2 to 381 mm) tires.
6. Fit the adapter and extension tube to the valve.
7. Pump solution into the tire until it pours from the breather hole.
8. Turn the wheel until the valve is in the "12 O'clock" position.
9. Continue pumping until the solution again pours from the breather hole. When this occurs, the tire should be 90 to 97% full.
10. Remove the adapter and extension tube.

When the tire is in this condition, the small space at the top of the tire containing air cannot be filled satisfactorily. In fact, this small space will be at only 6 – 7 psi (0,455 kg. / $cm^2$) and will act as a 'cushion chamber'. This lower pressure will also allow the tire to 'bulge' slightly more, but the water will give the sidewall plies more support than would the same pressure of air, thus allowing the tire to retain its self cleaning properties and strength.

***Essential Facts when Liquid Ballasing***

1. Always use a proper air-water pressure gauge, as a normal air type gauge will be rapidly corroded by calcium chloride solution.
2. Never attempt to inflate the tire with the wheel resting on the ground.
3. Always use an open topped container when mixing calcium chloride solution.
4. Never pour water on calcium chloride.
5. Always partially inflate the tire with the valve in the lower position when 100% ballasting.

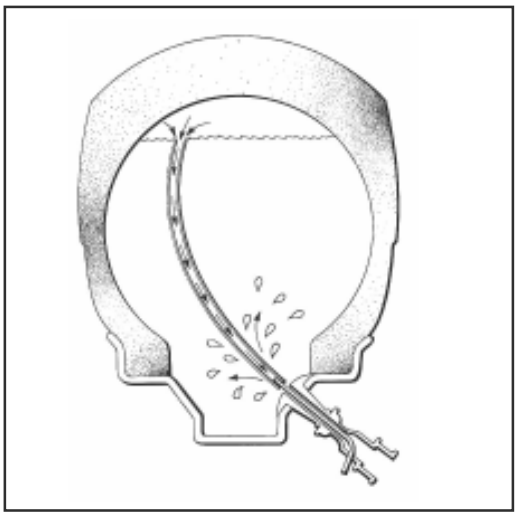

Fig. 12

## 15.A.9FAULT FINDING CHART

| Symptom | Possible Cause | Suggested Cure |
|---|---|---|
| Wheelspin | Too low gear | Use the highest gear that the tractor will pull without labouring |
| Wheelspin due to tires loading with soil | Tire pressures excessive | Adjust the pressures to the manufacturer's recommended minimum |
| | Inadequate tire pressures | Raise the tire pressure to that correct for the load on the rear end of the tractor |
| | Insufficient weight acting on the rear end of the tractor | 1. Fit wheel weights<br>2. Water ballast tires.<br>3. Try narrower section tires. |
| Wheelspin the tire retains its self-cleaning action and sinks into the ground | Inadequate weight on the front end of tractor | Fit weight frame and front-end weights |
| | Too narrow section tire for the weight being carried by the rear end of the tractor | 1. Fit wider section tires.<br>2. Reduce the weight on the rear end of the tractor |
| | Lug-bar type tires being used in sand | Use either grassland / sand type tires, or heavily worn lug-bar type tires |
| Tractor swerves from side to side when being driven on hard ground (e.g. road) | Tire squirms due to excessively low pressures | Raise the tire pressures.This compliant can cause rapid tire wall wear and consequential failure |
| Tire tread worn unevenly when used for long periods on the road | 1. Too low pressure<br>2. Overloading | Raise pressure –<br>This compliant is indicated by wear on the leading and trailing edges of the lug-bar |
| Uneven tread wear | Over-inflation | Adjust pressure to those recommended by tire manufacturers. This problem is indicated by wear to the centre of the tread only. |
| | Wheels running out of true | 1. Jack up axle to relieve wheel of weight, slacken and retighten wheel nuts.<br>2. Check that the tire is located accurately on the rim. |
| Tire creep | Too low tire pressure | 1. Increase tire pressure.<br>2. Check the condition of both the rim and bead and replace as necessary.<br>Certain sizes of wheel are available with knurled rims. |
| Split side wall | Under-inflated tire striking a sharp object | Minor splits are repairable. In cases of severe damage the tire must be replaced. |